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ABSTRACT

A review of the information provided by rural sociologists and agricultural extensionists regarding the adoption of new and/or improved farm practices in Nigeria in order to determine their contribution to the transfer of technology to farmers indicates that a great deal of attention had been paid to communication variables and to personal and social characteristics of the farmer: however, psychological factors, the farm organization, community norms, and institutional factors have almost been ignored. Although the research results of the studies reviewed are inconsistent, the following observations emerge: (1) in general, farm size, formal education, participation in formal organizations, leadership status, and level of living (measured in terms of the number of selected household items possessed) are positively associated with adoption of new and/or improved farm practices: (2) the most often used sources of farm information are radio and extension agents, with radio far exceeding extension agents: and (3) exposure to radio farm programs and extension contact are positively related to adoption. Agricultural economists and rural sociologists should be involved in choosing innovations to be recommended to farmers, and, most importantly, farmers should be involved in the selection of innovations to be researched or introduced to farmers. (Author/CM)

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AN APPRAISAL OF THE CONTRIBUTION OF RURAL SOCIOLOGICAL AND AGRICULTURAL EXTENSION RESEARCH TO THE TRANSFER OF TECHNOLOGY TO SMALL SCALE FARMERS IN NIGERIA*

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ABSTRACT

The attempt in this paper has been to review the information provided by rural sociologists and agricultural extensionists on the adoption of new and/or improved farm practices in Nigeria in order to determine their contribution to the transfer of technology to farmers.

The available information indicates that a great deal of attention has been paid to communication variables, personal and social characteristics of the farmer. On the other hand, psychological factors, the farm organization, community norms and institutional factors have been almost ignored.

Although the results of the studies reviewed are inconsistent, a number of observations could be made.

1. Generally, farm size, formal education, participation in formal organizations, leadership status and level of living (measured in terms of the number of selected household items possessed) are positively associated with adoption of new and/or improved farm practices.

2. The most often used sources of farm information are radio and extension agents, with radio far exceeding extension agents.

3. Exposure to radio farm programmes and extension contact are positively related to adoption.

The possible role of the above observations in influencing or strengthening existing philosophy and methods of transferring farm practices to the small farmer are noted. Suggestions are made for future research.

AN APPRAISAL OF THE CONTRIBUTION OF RURAL SOCIOLOGICAL AND AGRICULTURAL EXTENSION RESEARCH TO THE TRANSFER OF TECHNOLOGY TO SMALL SCALE FARMERS IN NIGERIA

The need to increase agricultural productivity in Nigeria has been recognised by farmers, agricultural scientists and ~~policians~~ politicians. Although diverse factors have been recognised as contributing to increased productivity, much emphasis has been placed on the need to change the farming technology. It is argued that although the traditional farming system might have satisfied the needs of peasant society it has not been able to adequately supply the needs of present day Nigeria. Thus there has been a great deal of effort by both agricultural scientists and government officials to change the farming practices of Nigerian farmers through the introduction of new and/or improved technology. These attempts have met with relative success in certain areas while in other areas there has been failures. As a result a number of questions emerge:

1. Why are some recommendations readily accepted by the farmers and others totally rejected?
2. Why do some farmers accept and adopt recommended practices much earlier than others?

In an attempt to seek answers to these questions, the natural and physical agricultural scientists occasionally seek the help of the social scientists. Rural sociologists and extensionists are among those social scientists who have attempted to provide answers to the above questions. From the end of the 1960's up till now a number of rural sociologists and extensionists have taken up the challenge to provide explanations for adoption and/or non-adoption of recommended practices. However, there has been no attempt to systematise the results of these studies to determine what generalizations if any, we can draw from them.

The attempt in this paper, therefore, is to review the available information on adoption and diffusion of recommended farm practices in Nigeria with the view of determining what generalisations, if any, we

could derive from them. Secondly, an attempt will be made to indicate areas of research that are not adequately covered. The review which follows reveals the judgement of the writer. It is likely that two reviewers would use different frameworks. The emphasis in this review is on substantive findings rather than methodology. We are however aware that this approach decreases the comparability of the findings. For example, lack of comparability in the measurement of innovation could lead to divergent findings between studies. However, as most of the studies reviewed here are descriptive, we hope this would enable us to have an overview of the state of knowledge in this field.

Since adoption and diffusion of innovation research in Nigeria has been modeled on the assumptions and theoretical framework of North American researchers, a brief review of the North American perspective will contribute to our understanding of the review which follows.

As pointed out elsewhere (Momu and Omole, forthcoming) the basic tenet of the diffusion of innovation theory is that the dissemination of information is the basic sociological process leading to agricultural productivity throught the adoption of new and/or improved practices. As Katz et. al. (1963) point out, "viewed sociologically, the process of diffusion may be characterized as the (1) acceptance (2) overtime (3) of some specific item - an idea or practice (4) by individuals, groups or other adopting units linked (5) to specific channels of communication (6) to a social structure and (7) to a given system of values or culture" (1963: 240). The general conclusions of research findings could be described as follows. Members of a social system can be rated on how progressive they are, that is how soon and how often they adopt new ideas introduced into the social system. A new idea is initially adopted by a very small but highly innovative group. These individuals are able to take the necessary risk because of their high economic status, while at the same time their position in the social system allows them to ignore tradition and social control. From these innovators those with high social and leadership status learn and adopt the new idea. The new idea

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then spreads throughout the social system until most of the members adopt it. Innovators are said to be different from late or non-adopters on a number of socio-demographic factors. The innovative farmers are shown to have larger farms, more formal education, more contact outside their social system and more contact with communication channels disseminating farm information. It is also noted that the importance of each communication channel differs from one stage of the adoption process to the other. Thus mass communication is an important information source to develop and/or increase an awareness of an innovation while interpersonal sources of information are crucial in the trial and adoption of the innovation.

The present review is partly based on the framework of Jones' (1966) review of adoption and diffusion research throughout the world. Jones (1966) has classified the adoption and diffusion process into five areas of research,

"1. An innovation or an improved practice, or a collection of such innovations and

2. 'The adopter' (including within this term both an individual or some social group as the adopting unit and also the potential adopter and rejector of the innovation(s) concerned), emphasizing not only the personal and situational traits which are associated with the adopter's decision which include

3. His perceptions of the characteristics of the innovation(s) but also

4. The process by which the innovation spreads through a given social system and

5. The functions of various communication media and channels in the process involved" (1966: 4).

Recommended Practices (Innovation):

Recommended farm practices may range from items which are only slightly different from existing practices and technique to those which involve completely new concepts in farm technology. In Nigeria

innovations have either been studied as single farm practices or as an innovation score based on a number of recommended farm practices. There are a set of implicit assumptions underlying the use of adoption scores. These are:

1. All farm practices included in the score are of the same level of complexity.
2. The type and availability of the resources required to adopt the different farm practices are the same.
3. The benefits accruing to the farmer for adopting the various recommendations are the same.

An examination of the composition of some of the adoption scores used in the studies under review casts doubts on the validity of these assumptions. Alao's (1971) adoption score covers a variety of crops (including cocoa, oil-palm, maize, cassava) and farm practices ranging from use of chemical fertilizer to supply of clean water to poultry. Likewise, Rogers and his associates (1970) compiled their "innovativeness score" from 14 recommended practices, covering oil-palm, cassava, yam, rubber, cashew, rice, poultry and credit. Although Rogers and his associates argue that they "tried to select innovations that were approximately equally applicable to ecological conditions in each of the 18 phase II villages", the fact is the cost and knowledge involved in adopting chemical fertilizer are not the same as those required for providing poultry with clean water. In the same vein, although Voh himself has given different reasons for farmers' adoption of the various recommended practices he studied (1979: 12), he went ahead to base his analysis on adoption score.

The research findings of Monu(1980); Williams (1968); and Clark and Akinbode (1968), show that within the Nigerian context adoption scores must be used with caution. In an analysis of factors explaining differential adoption of 3 recommended practices among cocoa farmers, it has been found that the combination of variables explaining the greatest amount of variance explained by the independent variables

utilized in the study differ from one practice to the other. In other words, each of the independent variable's contribution to the explanation of differential adoption of each of the dependent variables vary from one dependent variable to the other (Monu, 1980). Similarly, Clark and Akinbode (1968) in their study of factors associated with adoption of improved maize, spraying cocoa, and production of poultry and eggs, found that the relationships between the independent variables and the dependent variables differ greatly from one farm practice to another. In addition, Williams (1968) notes that farmers give different reasons for adoption or non-adoption for the various recommended practices he studied.

Further, there is an implicit assumption by the researchers listed in Table 1 that the recommended practices are good and beneficial to the farmer. In fact none of the studies reviewed in this paper has made an attempt to examine how suitable and practicable these practices are on the farmers' plots. In so doing the researchers have made no room for rational rejection. The result of such studies therefore is by implication, innovators are regarded as good and rational while non-adopters are regarded as bad and irrational. The fact is even one of the fathers of adoption research (Rogers, 1962) recognizes the fact that the characteristics of the recommended practice may influence the decision to adopt. In other words the way the farmer perceives the innovation is an important element in the adoption process. Rogers (1962) lists five characteristics of the recommended practice to be considered.

1. Relative advantage - the degree to which the recommended practice is superior to the one it supersedes. In this regard factors like perceived economic efficiency and benefits should be considered.
2. Compatibility - the degree to which the recommended practice is consistent with the existing cultural values and past experiences of the farmers.

3. Divisibility - the degree to which the recommended practice can be tried on a limited basis. Some practices can be tried on a small scale while others can not.

4. Complexity - the degree to which a recommended practice is relatively difficult to understand and use.

5. Communicability - The extent to which the recommended practice can be easily observed and communicated to others.

The above factors have to be considered seriously in light of the evidence available to us on some of the agricultural development programmes in Nigeria. For example Wallace (1979) notes that the low yield of wheat experienced by farmers at the Kadawa irrigation scheme is the result of the conflict between growing of wheat in the dry season and growing of the staple food crop, guinea corn, in the wet season. "Guinea corn is harvested too late to allow the planting of wheat by mid-November. If wheat is planted late the yield drops dramatically. Thus in order to plant wheat on time the farmer must have cleared his land in preparation for the tractors by October. If he uses the land to grow guinea corn in the wet season his land can not be cleared until early December" (Wallace, 1979: 12), Thus in order to ensure adequate supply of his staple food, guineacorn. the farmer rejects the recommended date of planting wheat. In other words the farmer is prepared to get lower yields of wheat in order to supply his family with the guinea corn needed for consumption. Similarly cocoa farmers have rejected planting cocoa on traces cut through the bush rather than clearing the whole farm (Monu and Omole, 1980). This is because the recommendation ignores the farming practices of the cocoa farmers. Most cocoa farmers practice intercropping or mixed farming. This means, normally, the farmer has other food crops like cassava and cocoyam on the farm prior to planting cocoa. If he adopts "trace cutting" weed will simply destroy his food crops. The alternative will be to adopt sole cropping of cocoa, in which case he has to purchase his food. This could be a strain on the resources of the farmer considering the price of food these days and the low local purchase

price for cocoa.

The point we are trying to make is that the nature and type of the practices recommended do influence the decision to adopt, hence such factors must be included in "adoption studies".

The Adopter (INNOVATOR):

In all the studies reviewed in this paper the individual farmer is the unit of analysis. Because of this focus, only those agents which come into direct conact with the farmer are included in these researches.

It is our view that in order to fully understand the adoption process we need to start with those who recommend the practices - the scientists. Unless this is done farmers will always be blamed for non-adoption of the recommended practices. It seems this is what Coughenour (no date) has in mind when he suggests that the "system of innovators" form part of diffusion studies. The system of innovators refers to "the organized groupings of applied scientists whose specific purpose is to innovate" (Coughenour, no date: 11). Each innovative system has values, norms and roles peculiar to their particular function. In Nigeria much of the farm practices that are recommended to farmers emanate from research institutes and universities. We need to understand the values, the attitudes of these researchers in addition to the decision making processes and the social constraints that operate in their environment. In Nigeria the socio-economic gap between the researcher and the peasant farmer, who is presumably the intended eventual consumer of much of the research, remains immense. This is even more so when foreign consultants are involved.

There is therefore a need to understand why certain crops are researched over others, why one improved paractice receives greater support from the research institute than others, how research priorities are set and the professional socialization process of the researchers. Further, we need to understand the communication proces involved in

transmitting research findings from research institutes to the agents who deal with the farmers. Our view is that the present practice whereby the diffusion researchers have ignored research institutes, including the men and women in them and the origins of the recommended practices, has led to an incomplete picture of the adoption and diffusion process.

Secondly, the emphasis on the farmer (usually the male head of the farm family) has led to an overemphasis on individual characteristics in comparison with group and institutional characteristics. The fact is the correlations often reported between socio-demographic characteristics and adoption may simply be reflections of institutional factors and the nature and type of recommended practices under study. For example, Obibuaku (1967) has shown that the discontinuance of the use of the hydraulic oil press among women of Gbedun (a Yoruba village) was due to the change agents' ignorance of the role of women in family decision-making and the benefits women derive from three by-products of the traditional processing method. Money from the three by-products belong to the women while all money derived from the sale of the oil went to the husbands. With the introduction of the hydraulic oil press, the women lost two of the by-products thereby suffering a drastic decline in income while the husbands benefit from an increase in the quantity of oil produced. In addition, the women have to do their processing within a certain period of the day since the press was opened only between 7 a.m. to 3 p.m. daily. During the planning stage of the introduction of the oil press, most of the meetings were held between government officials and men in the village in the belief that once the men were convinced their wives would acquiesce. Thus they completely ignored the fact that the women were in total control of the processing.

Factors Associated With Adoption and Non-Adoption

Table 1 About Here

The major objective of the studies reviewed in this paper is to explain differential adoption of new and/or improved practices among farmers. Each of the studies utilizes a set of independent variables to explain adoption. Table 1 shows the categories of independent variables employed in each study. The information presented in Table 1 clearly shows the concentration of research on certain variables while others are almost ignored. Of the 12 studies listed in Table 1, ten of them have incorporated communication variables while six have included personal characteristics and five of them have investigated social characteristics. On the other hand, only four of the studies listed have incorporated farm characteristics while only two of the studies investigate variables relating to community norms and institutions, and only one of them included psychological variables.

Farm Characteristics:

Table 2 About Here

The information presented in Table 2 shows that only four studies contain variables related to farm characteristics. A detailed review of the four studies reveals that Voh (1979) has included only number of farm sites in his study while Basu (1969) studied farm size and land tenure status, and Clark and Akinbode (1968) included size of farm and value of farm products sold in their analysis. Alao (1971) on the other hand, studied number of farm locations, acreage of food crop planted, acreage of cash crop planted, regular farm labour size and amount paid for hired labour. Basu (1969) found a positively significant relationship between farm size and adoption score Likewise, Clark and Akinbode (1968) observed positive significant relationship between farm size and three innovations they studied.

On the other hand, while Alao (1971) reported a positive significant relationship between number of farm sites and adoption score, Voh (1979) observed no significant relationship between the same variables. Of all the variables investigated by Alao (1971), the only non-significant relationship reported is the relationship between farm labour size and adoption score.

The findings summarised above clearly indicate the failure of these researchers to investigate the role of the social organization of the farm in the adoption process.

We suggest that the inability on the part of researchers to provide for the possibility of rational rejection of recommended practices is partly due to lack of information on farming and farming systems in Nigeria. For example, Norman et. al. (1974) in their assessment of cotton growing recommendations point out that three main factors will determine whether the improved practices are adopted. First, the extent to which the recommended practice complements or conflicts with the farmer's fundamental aim of maximum profit subject to security constraint. They point out that being a non-food crop cotton has a low priority in the Nigerian farming system. They note that the planting of sprayed sole cotton in June weakens its competitive position with food crops which receive priority during the first rains. In addition, large volumes of water are required for the spraying. Apart from the cost involved there is the nuisance of having to get water to the fields.

Secondly, the ability of the farmer to accept the innovation must be considered. The adoption of the cotton spraying recommendations costs a significant amount of money. The average farmer is unlikely to to find the money, especially when the demand occure soon after the rainy season before any crop has been harvested, hence the farmers cash resources are at the lowest.

Thirdly, if the recommendations are to be adopted by the farmer all inputs such as credit, fertilizer, insecticides and spraying equipment must be readily available at the correct time.

We are aware that the type of data called for here could only be collected through multidisciplinary studies. To this end, collaborative research between agricultural economists and rural sociologists cum extensionists is not only desirable but mandatory.

Personal Characteristics

Table 3 About Here

Those researchers who have included personal characteristics in their studies are mainly interested in investigating the relationship between personal characteristics of the farmer and adoption of recommended practices. Table 3 shows the variables studied by the various researchers and the nature of their relationships with adoption. The evidence in Table 3 shows that the relationships between the personal characteristics and adoption differ from one study to another.

Of the six studies, only Rogers et. al. (1970) found a statistically significant relationship between age and adoption score. With respect to formal education, both Alao (1971) and Basu (1969) reported non-significant relationships with their adoption scores. On the other hand, while Voh (1979) and Rogers et. al. (1970) report significant relationships between formal education and their adoption scores, Clark and Akinbode (1968) found a statistically significant relationship for only one of the three farm practices studied. Likewise, Mabawonku and Osuji (1978) observed significant relationship between formal education and adoption score in only one of the four villages studied. Of the four studies which have investigated the relationship between literacy and adoption, only Alao (1971) observed a non-significant relationship. Finally Clark and Akinbode (1968) found a significant relationship between farming experience and only one of the farming practices investigated, while Basu (1969) report a non-significant relationship. The relationship between education and adoption

reported in Table 3 tends to deviate from those observed in North American studies. On the whole education is found to be positively related to adoption in North American studies (Jones, 1967). The lack of consistency in the relationship between education and adoption in Nigeria could be due to the fact that the differentiation among farmers with regard to education is not great.

Social Characteristics

Table 4 About Here

The information presented in Table 4 shows that social characteristics rank third in terms of the variables most often included in adoption and diffusion studies in Nigeria. The information in Table 4 show the social variables employed by the researchers and the nature of the relationship between these variables and adoption.

There are two assumptions for including family size in adoption research. One is that the primary source of labour of a peasant farmer is his family. Hence large families, especially those with grown-up children, are likely to enhance adoption chances, especially those recommended practices which require additional labour. On the other hand it is argued that large families act as a drain on the resources of the farmer. This is more so in light of the introduction of the Universal Primary Education scheme throughout the country. Thus, rather than aid adoption a large family size is likely to contribute to non-adoption since the farmer may not be able to marshall the resources needed for some of the recommended practices. This is because apart from the fact that the farmer is deprived of the labour of his children, he also has to provide for their school needs. Clark and Akinbode (1968) found positive statistically significant relationships between family size and adoption of farm practices associated with cocoa and Poultry-egg practices but not with maize. Alao (1971) also found a positive significant relationship between family size and adoption score.

As pointed out by Rogers et. al. (1970), material possession may reflect a past innovativeness which provides the ability to purchase the level of living items or it may be that greater wealth facilitiates the adoption of costly new ideas. It is therefore assumed that propensity to adopt farm practices will be positively related to high level of living score (based on possession of a number of household items). The information presented in Table 4 show that in the studies which investigate level of living, positive significant relationships have been found between level of living and adoption.

Studies conducted in North America and Europe report positive relationships between participation in formal organizations and adoption. It is pointed out that involvement in organizations exposes the farmer to other sources of information which otherwise would be unavailable to him. The involvement of Nigerian farmers in organizations, especially farmer co-operatives, could prove to be important in the adoption process, in light of recent evidence that the co-operatives are becoming important medium for dissemination of farm information (Monu and Omole, forthcoming). Table 4 reveals that Rogers et. al. (1970) and Basu (1969) found positive statistically significant relationship between participation in organisations and adoption score. Likewise Clark and Akinbode (1968) reported positive statistically significatn relationship between participation in organizations and maize and poultry-eggs practices.

The two studies which used leadership status as an independent variable, Rogers et. al. (1970) and Voh 1979), found a significant relationship between leadership status and adoption. The neglect of leadership status in adoption studies in Nigeria is rather surprising considering their emphasis on the diffusion model. According to Ekpere (1974), "considering the short fall of extension manpower and the extensive areas covered by a single extension worker, the development of local leadership is especially important. Such local leaders, it is expected, provided a multiplier effect to extension worker efforts in reaching local farmers" (1974: 24), Indeed in a recent

study Monu and Omole (forthcoming) report that an equal percentage of the farmers studied, regard extension agents and other farmers as the most important and useful source of farm information. Thus there is, a need to identify these opinion leaders and investigate the role they play, if any, in the adoption process.

Psychological Factors

Researchers in North America and Europe have found various relationships between psychological variables and adoption. Positive relationships have been found between adoption and high levels of rationality, risk taking, favourable attitudes towards change and use of credit. The findings with respect to the relationship between farmers' levels of aspiration and adoption are inconclusive (Jones, 1967).

The information presented in Table 1 show that only one of the studies under review has incorporated psychological variables in his analysis. Voh (1979) includes the variable empathy in his analysis. He defines empathy as "the degree to which an individual was able to place himself in the state of others" (1979: 20).

Community Norms and Institutional Factors

The paucity of studies which deal with community norms and institutional factors is clearly revealed in Table 1. Only two studies have dealt with aspects of community norms and institutional factors. Even of these two, one (Alao, 1971) concentrates entirely on the concept of community structural differentiation. Differentiation is defined as the "diversity of social symbols maintained by a community" (Young and Young, 1973). It is normally operationalised through a Guttman Scaling of items drawn from village institutions - governmental, commercial, educational and social (see Alao, 1971: 56-63). Alao (1971) found no statistically significant relationship between community differentiation and adoption. Obibuaku (1967) on the other hand focused

his attention mainly on traditional community norms as barriers to adoption. He explains the low acceptance of the hydraulic oil press by women in terms of the incongruity between the accepted traditional norms which governed the sharing of the proceeds of oil-palm products between husband and wife, and use of new technology which called for a new distributive system.

In a sense it is not surprising that little attention has been paid to community norms and institutional factors by Nigerian researchers. As pointed out earlier, the major frame of reference for these researchers is the diffusion of innovation model developed in North America (Rogers, 1969; 1971). This model emphasises the communication process of the diffusion of innovation and pays very little attention to community norms and instituttional factors.

It is our view that even if such factors are unimportant in the adoption process of North American farmers the same is not true for Nigerian peasants. Obibuaku (1967) for example, has demonstrated clearly the need to understand community norms before introducing new technology to Nigerian communities. More recently Huizinga (1979) has demonstrated how the traditional leadership structure could prevent peasants from benefiting from improved farm practices. His analysis shows that peasant farmers were able to receive fertilizer only when a distribution organization independent of the traditional community leadership was set up.

Further, as Coughenour (no date) has pointed out, while diffusion of technology is usually thought of in terms of diffusion of new ideas, it often involves material artifacts as well which are distributed through different means and different channels. There is therefore a need to understand the structure and functioning of the institutions responsible for distributing such artifacts.

In the first place, it is important to understand how co-operatives and the Nigerian Agricultural Credit and Co-operative Bank or other credit agencies which serve the farmer operate. What are the requirements for obtaining loans? Are Nigerian small scale farmers likely to meet these requirements? In other words, who benefits from the loans offered by these agencies?

Secondly, is the prevailing land tenure system conducive to increase in agricultural production by the small scale farmer? As Famoriyo (1979) has pointed out, the emergence of modern, monetized economy together with a highly materialistic society has brought new demands as well as social and economic pressures on the land tenure systems. As a result, the land tenure systems have exhibited a number of defects. The question to be answered is to what extent has the current land tenure system acted as a barrier or a catalyst in the adoption and diffusion of farm technology?

Furthermore, there is an urgent need to include factors associated with transportation and marketing in adoption studies. Recently farmers within the Funtua Agricultural Development Area in Kaduna State, have indicated unwillingness to continue to grow corn because of lack of markets to sell their produce. Without a good network of roads linking farmers with markets, it will be difficult for them to evacuate their produce. The result may be non-adoption of farm recommendations, especially those that involve high expenditure, since the farmer is not likely to recuperate his expenditure.

All the above go to strengthen Galjart's (1971) view that, "the refusal to accept knowledge may denote inability to adopt the corresponding innovation, not unwillingness to listen to new ideas. The assumption that the acquisition of knowledge is the basic process of agricultural modernization may lead to overemphasis on the factors ignorance and unwillingness and to a disregard of the factor inability" (1971: 35). The fact is, for a farmer to accept a new farming practice, he must not only be able to acquire the necessary inputs, he must also be sure that he will recover

his expenditure and ideed make profit from the innovation.

Communication Variables

Table 5 About Here

As noted earlier, the basic tenet of the diffusion of innovation theory is that the dissemination of information is the basic sociological process leading to agricultural productivity through the adoption of new and/or improved farm practices. It is therefore not surprising that much attention has been devoted to the investigation of the role of communication variables in the adoption process. As Jones points out the communication variables incorporated into adoption and diffusion research could be summarised as follows:

"2. The mass media, including radio, television, newspapers, journals, leaflets, brochures, etc.

2. Personal contact with advisers or representatives from agricultural extension agencies and commercial firms or quasi-commercial organizations.

3. Inter-personal contacts between friends and neighbours, usually other farmers" (1967: 17).

The information presented in Table 1 clearly show that communication variables are the variables most often ivestigated by adoption researchers in Nigeria. Only two of the studies listed in Table 1 do not include communication variables in their analysis. Table 5 shows the communication variables incorporated into the studies under review. Three variables (extension agent contact, radio and pamphlet/newsletters) are the variables most often ivestigated, with extension contact appearing in all the studies while radio and pamphlets/newsletters are found in six of the studies.

It is rather surprising that only three of the studies have included other farmers as sources of information. Diffusion of innovation researchers in North America have pointed out that inter-personal communication provides most of the multiplying effect of local change agent efforts in getting new information and practices accepted and used.

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As Lionberger and his associates point out, "if all of the information from specialized agency sources has to flow directly to farmers and if all the persuading had to be done by their representatives, acceptance would likely be very slow indeed" (Lionberger et. al., 1975: 7). Farmers perform different functions in information dissemination. First, farmers who have had actual experience using the new practice demonstrate their appropriateness to the local environment. Then there are those farmers who are effective communicators and do get information around even if they are not sought by other farmers. Lastly there at Lastly, there are those farmers hwhose judgement is valued by their colleagues and are often sought for advice when making important decisions. The recent findings of Monu and Omole (Forthcoming) which show that cocoa farmers regard other farmers as equally important and useful source of information as extension agents, underscore the importance of this variable.

The general conclusion we can derive from these studies are twofold.

1. The most often used sources of farm information by Nigerian farmers are radio and extension agents.
2. That extension agent contact and exposure to radio farm programmes are positively significantly related to adoption of recommended farm practices.

The studies reviewed here have concentrated mainly on what sources farmers derive their farm information from and the effect of exposure to these sources on the adoption behaviour of the farmer. No attempt is made to determine how adequate the information is or to analyse the process of disseminating the information. The fact is extension agents themselves must be made aware of new and/or improved farm practices. The extent to which the extension agent propagates the information on a particular recommended farm practice will depend on his attitude to the recommendation, the support he receives from his sponsoring organisation, and the satisfaction and reward attached to the job. It

is therefore possible to attribute non-adoption of certain recommendations to lack of enthusiasm on the part of extension agents to disseminate the information on those recommendations. Our analysis must therefore, not be focused only on the farmer, we must also investigate the bureaucratic constraints of the extension agent and how these affect his relationship with the farmer.

In addition we learn from North American researchers that mass communication is used as an information source to develop and/or increase an awareness of an innovation while inter-personal sources of information are regarded as crucial in the trial and adoption of the innovation (Rogers, 1971). Given the fact that the most often used and readily available source of information by Nigerian farmers is radio and given the inadequate number of extension agents at the moment (ratio of extension agents to farm families is 1:1,260), we need to investigate the ways in which radio could be improved as a communication medium. It may also be useful to determine the effectiveness of group extension method on experimental basis.

More important, diffusion researchers in Nigeria have almost ignored the structure and organization of the extension service in their investigation of adoption of farm practices. As Ekpere (1974) has pointed out, the job performance of extension officers is likely to be affected by the objectives (both stated and implicit), the social organization, programme development, staff management and supervision within the extension service. More often than not, it is assumed that all is well with the extension service itself, hence the characteristics of the farmer and contact with information sources become paramount in diffusion research.

Policy Implications

Although the findings reported in this review tend to be inconsistent, some general observations could be made.

1. Generally, farm size, formal education, participation in formal organizations, leadership status and level of living (measured in terms of the number of selected household items possessed) are positively associated with adoption of new and/or improved farm practices.
2. The most often used sources of farm information are radio and extension agents with radio far exceeding extension agents.
3. Exposure to radio farm programmes and extension contact are positively related to adoption.

The above findings have either influenced or strengthened existing philosophy and methods of transferring new farm practices to the small farmer. First, by concentrating on socio-demographic and communication variables these researchers, by implication, have strengthened the view that if only the farmer changes his values and demographic characteristics the diffusion process will be faster. Thus it is assumed that faster adoption rate will result from improved levels of education, influence of Western religion, growing urbanization and industrialization. Thus issues such as, how sensible the recommended practice is', how compatible the recommendation is with existing values and farming system', are there adequate institutional support mechanisms? and whose interest is best served by the innovation, attract little or no attention.

Secondly, the findings that size of farm, level of formal education, level of living and leadership status are positively related to adoption is used to reinforce the use of the "progressive farmer strategy". The assumption is that innovations trickle down from progressive farmers (farmers who are move innovative and socio-economically advantaged) to non-progressive farmers. Thus, the best strategy for the extension agent is to work with the progressive

farmers whose adoption will create a multiplier effect throughout the system. The fact is, Ascroft and his associated (1973) have shown that there is an alternative and perhaps better method to the progressive farmer strategy of disseminating farm recommendations. In their field experiment in the Tetu Division of Kenya, they have demonstrated that "non-progessive farmers" could be innovators if only the extension programme is designed to meet their needs and if their socio-economic conditions are taken into consideration in the design of the programme. The project was designed specifically to counteract "the inequity increasing effects of the diffusion process and the de-facto progressive farmer strategy". In their report on the experiment they concluded, "in all, then, there seems little doubt that 100 per cent or only slightly fewer of the farmers had planted hybrid maize" (Ascroft et. al., 1973: 69).

Similarly, Roling and his associates (1976) have cogently argued that the disadvantages of the progressive farmer strategy far outweigh the advantages. They argue that the diffusion of innovations approach, based on the progressive farmer strategy and the notion that innovations diffuse autonomously only leads to inequity in rural development. This inequality results from the fact that while the late adopters are still adopting an earlier innovation, progressive farmers are already reaping benefits from those more recently introduced. Secondly, progressive farmers reap "windfall profits", since they start producing at a time when the product is relatively scarce hence prices are likely to be high. More often than not the concentration on progressive farmers for introducing an innovation in addition to their socio-economic status give them greater access to such resources as credit, land, labour and technical assistance.

There is thus a need to critically examine the progressive farmer strategy as applied in propagating recommended farm practices and come up with alternative approaches if possible.

Summary and Conclusion

The attempt in this paper has been to review the available information on the adoption and diffusion of new and/or improved farm practices in Nigeria in order to determine the general conclusions we could draw from them. In this exercise we have limited ourselves to information provided by rural sociologists and agricultural extensionists.

The available information indicate that a great deal of attention has been paid to communication variables, personal and social characteristics of the farmer. On the other hand, psychological factors, community norms and institutional factors have been almost ignored. Although few studies include farm characteristics only one study incorporate more than two different variables dealing with different aspects of the farm. Surprisingly, only one study investigates the effect of community norms on the adoption process.

Although the research results of the studies reviewed are inconsistent, a number of observations could be made.

1. Generally farm size, formal education, participation in formal organizations, leadership status and level of living (measured in terms of the number of selected household items possessed) are positively associated with adoption of new and/or improved farm practices.

2. The most often used sources of farm information are radio and extension agents with radio far exceeding extension agents.

3. Exposure to radio farm prgrammes and extension contact are positively related to adoption.

The possible role of the above conclusions in stranthening the existing "progressive farmer strategy" in extension-work was noted.

We suggest that to understand the real factors influencing adoption of recommended practices we need answers to the following questions in addition to the information we already have on communication variables and socio-demographic characteristics of farmers.

1. How compatible is the recommendation with existing values and farming systems?
2. How does the recommendation complement or conflict with the farmer's aim of maximum profit?
3. What are the resources required for adopting the recommendation and do farmers possess or have access to these resources?
4. Are there efficient and non-discriminatory institutional support systems for the farmer?
5. What strategy of information dissemination is being pursued by the extension service?
6. Whose interest is best served by the adoption of the recommended practice?

It is our view that the above questions could be answered only through an inter-disciplinary research. At the moment natural and physical agricultural scientists test their innovations in the field to determine their reliability. We suggest that agricultural economists and rural sociologists be incorporated in the decision-making process related to deciding which innovations should be recommended to the farmers. The present practice whereby the agricultural economists and the rural sociologists examine the economic feasibility of the recommendation and factors which influence the adoption of the innovation after it has been recommended to the farmer is unacceptable.

Considering the multidisciplinary composition of some of the agricultural institutes in Nigeria, such as Institute of Agricultural Research and Training, Ibadan and Institute for Agricultural Research, Samaru, Zaria, we call upon these institutes to set up multidisciplinary research groups, not only to study the adoption and diffusion process of recommended practices but also to evaluate innovations before they are recommended to the farmer. More important, it is suggested that farmers be involved in the decision-making in the selection of innovations to be researched and/or introduced to the farmers. The involvement of the farmers in the selection of areas where new farm practices are needed and the type of farm practices to be introduced, is likely to lead to greater acceptance of these practices by the farmers.

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Table 1

CATEGORIES OF VARIABLES INVESTIGATED BY NIGERIAN "ADOPTION RESEARCHERS"

VARIABLES CATEGORIES	VOH 1979	NABAWONKU AND OSUJI 1978	PATEL AND EKPERE 1978	OBIBUAKU AND HURSH 1977	OBIBUAKU AND HURSH 1974	ALAO 1971	WILLIAMS AND WILLIAMS 1971	ROGERS ET. AL. 1970	BASU 1969	WILLIAMS 1969	CLARK AND AKINBODE 1968	OBIBUAKU 1967
Farm Characteristics	*	—	—	—	—	*	—	—	*	—	*	—
Personal Characteristics	*	*	—	—	—	*	—	*	*	—	*	—
Social Characteristics	*	—	—	—	—	*	—	*	*	—	*	—
Psychological Characteristics	*	—	—	—	—	—	—	—	—	—	—	—
Community Norms and Institutional Factors	—	—	—	—	—	*	—	—	—	—	—	*
Communication Variables	*	*	*	*	*	*	*	*	—	*	*	—

* Variable Included in Study

—— Variable not Included in Study

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TABLE 2

FARM CHARACTERISTICS RELATED TO ADOPTION OF RECOMMENDED PRACTICES

SOURCES	VARIABLES							
	FARM SIZE	NUMBER OF FARM SITES	ACREAGE OF FOOOD CROP	ACREAGE OF CASH CROP	VALUE OF PRODUCTS SOLD	FARM LABOUR SIZE	AMOUNT PAID FOR LABOUR	LAND TENURE STATUS
Voh, 1979	——	NS	——	——	——	——	——	——
Alao, 1971	——	*	*	*	——	NS	*	——
Basu, 1969	*	——	——	——	——	——	——	*
Clark and Akinbode, 1968	* 1,2,3	——	——	——	* 1,3	——	——	——

* Variable Statistically Significantly Related to Adoption at

NS Variable not Significantly Related to Adoption

—— Variable not Included in Study.

1,2,3 Refer to the Three Different Innovations Studied by Clark and Akinbode.

TABLE 3

PERSONAL CHARACTERISTICS RELATED TO ADOPTION OF RECOMMENDED FARM PRACTICES

SOURCE

VARIABLES	VOH 1979	MABAWONKU AND OSUJI 1978	ALAO 1971	ROGERS ET. AL. 1970	BASU 1969	CLARK AND AKINBODE 1968
Age	NS	NS	NS	*	NS	NS[1,2,3]
Formal Education	*	*[4]	NS	*	NS	*[2]
Literacy	*	—	NS	*	—	NS[1,2,3]
Farming Experience	—	—	—	—	NS	*[3]
Additional Occupation	NS	—	—	—	—	—
Income	—	*[3]	—	—	—	—

* Variable Significantly Related to Adoption at .05 Level.
NS Variable not Significantly Related to Adoption.
— Variable not Included in Study.
1,2,3 The Three Innovation Studied by Clark and Akinbode.
1,2,3,4 The Four Villages Studied by Mabawonku and Osuji. (The Analysis was carried out for the Villages separately).

TABLE 4

SOCIAL CHARACTERISTICS RELATED TO ADOPTION OF RECOMMENDED FARM PRACTICES

SOURCE

VARIABLES	Voh 1979	Alao 1971	Rogers et. al. 1970	Basu 1969	Clark and Akinbode 1968
Size of Family	NS	*	—	—	*1,3
Level of Living	*	—	*	—	—
Organizational Participation	—	NS	*	*	*2,3
Leadership Status	*	—	*	—	—

* Variable Significantly Related to Adoption at .05 Level.
NS Variable not Significantly Related to Adoption.
— Variable not Included in Study.
1,2,3 The Three Innovations Studied by Clark and Akinbode.

TABLE 5

COMMUNICATION VARIABLES INVESTIGATED

SOURCE

VARIABLES	VOH 1979	MABAWONKU AND OSUJI 1978	PATEL AND EKPERE 1978	OBIBUAKU AND HURSH 1977	YAZIDU 1975	OBIBUAKU AND HURSH 1974	ALAO 1971	WILLIAMS AND WILLIAMS 1971	ROGERS ET. AL. 1970	WILLIAMS 1969	CLARK AND AKINBODE 1968
Cosmopolitanism	*	—	—	—	—	—	*	—	*	—	—
Extension Contact	*	*	—	*	—	*	*	*	*	*	*
Radio	—	—	*	*	*	*	*	*	*	*	*
Film Exposure	—	—	—	*	—	*	—	—	*	—	—
Other Farmers & Friends	—	—	—	—	—	—	—	*	—	*	*
Newsletters and Pamphlets	—	—	—	*	—	*	*	*	*	*	*

* Variable Included in Study

— Variable not Included in Study